(12) UK Patent Application (19) GB (11) 2 355 057 (13) A

(43) Date of A Publication 11.04.2001

(21) Application No 9921340.7

(22) Date of Filing 09.09.1999

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(51) INT CL[7]
F42D 5/045

(52) UK CL (Edition S)
F3C CPK
A5A A28

(56) Documents Cited
GB 2335259 A GB 2276530 A GB 2222667 A
GB 2041178 A US 4836079 A

(58) Field of Search
UK CL (Edition S) A5A A28 A37 , F3C CPK CP2
INT CL[7] F42D 5/04 5/045
ONLINE: EPODOC, JAPIO, WPI

(54) Abstract Title
BOMB CONTAINMENT DEVICE

(57) A containment device 1 for use as a receptacle for a suspect explosive device 10 comprises a tube forming a wall of the receptacle and a support within the tube for supporting the suspect device. The material of the tube is comprised by a continuous elongated reinforcing material incorporated within a bonding material. A hollow stopper 5 is seated, in use, in the top end of the receptacle. It is formed of a frangible material and contains a liquid medium to act as a quenching agent for a wave front 9 released in the container on activation of explosion therewithin.

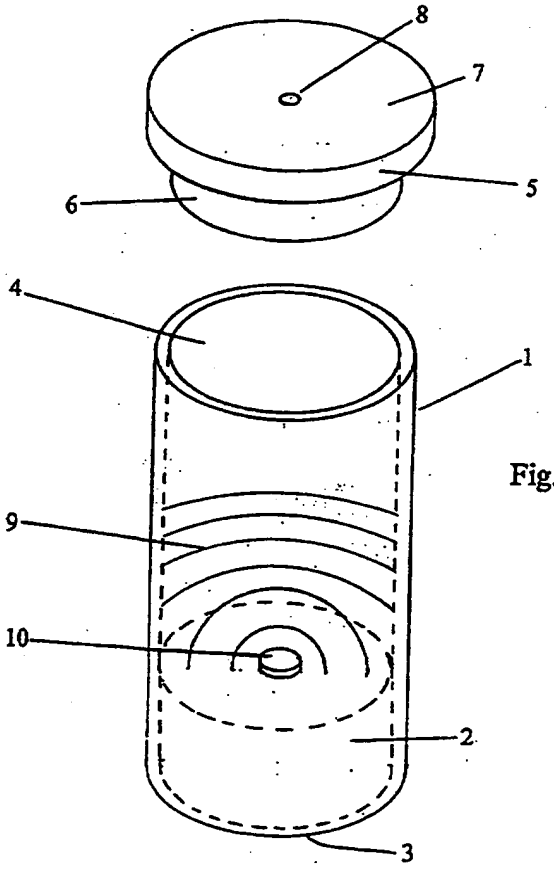

Fig. 1

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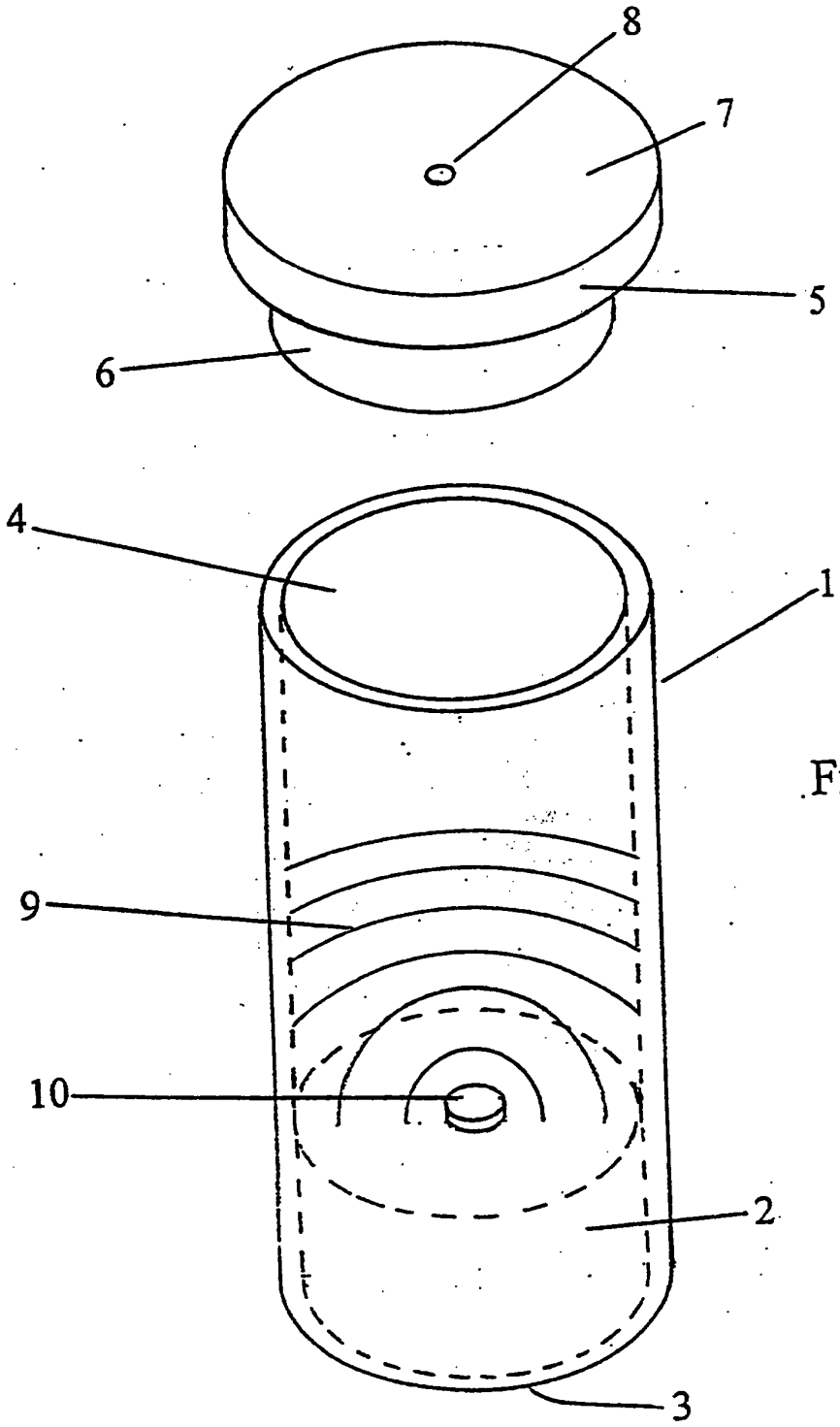
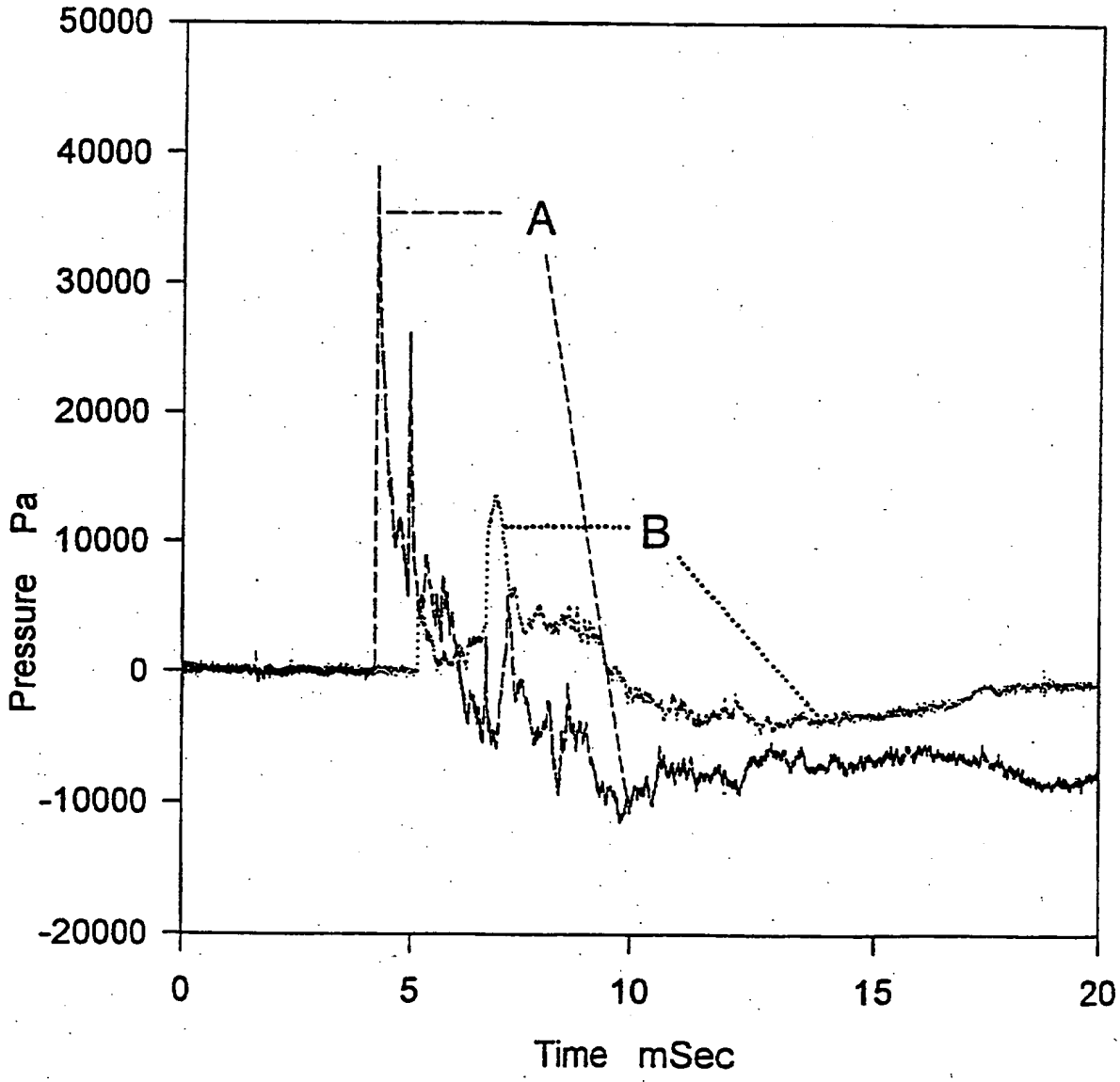


Fig. 1

Figure 2


50000
40000
30000
20000
10000
0
-10000
-20000
Pressure Pa
A
B
0
5
10
15
20
Time mSec

BOMB CONTAINMENT DEVICE

This invention relates to devices for containing the effect of detonation of suspect explosive devices.

Explosive devices concealed in letters or postal packages present a real hazard to postal workers handling the devices during their transmission through the post, as well as to the addressees of the items.

If, in the course of handling postal items, a package is suspected of containing an item which comprises an explosive device, the package is immediately isolated and one convenient method of achieving such isolation is to place the package in a receptacle which has been constructed as a containment device, ie. a device which prevents the full force of a blast therein being felt by a bystander, this resulting from pressure reduction which takes place within the container. Normally, no blast or explosion will take place but in some instances, an explosive device in a package may explode involuntarily on or after being placed in the receptacle.

Known receptacles, or "bomb boxes" as they are frequently termed, which are used as containment devices, rely on a large mass in the form of an infill of blast absorbing material, to absorb the blast and shrapnel effect of the explosion, but these have been found to be cumbersome and therefore unmanageable. There are also expensive.

A less expensive and less cumbersome solution to such difficulty is proposed in GB-A-2222667. A containment device according to this document comprises a tube forming the wall of the receptacle and a support within the tube for supporting a suspect device. The material of the tube comprises a continuous elongate reinforcing material incorporated within a bonding material. Preferably the tube is formed of GRP.

While such a "bomb tube" deals effectively with lateral fragmentation resulting from the detonation of suspicious packages, this "bomb tube" does not deal effectively with airborne fragmentation because it is not sealed at the top. Hitherto, attempts to provide a seal have led to the detonation causing a lid to be propelled into the air or to be shattered.

An object of the invention is to provide a containment device in which the pressure effect of an explosion and the velocity of fragmentation are reduced.

According to the present invention, there is provided a containment device for use as a receptacle for a suspect explosive device, the containment device comprising a tube forming the wall of the receptacle and a support within the tube for supporting the suspect device, wherein the material of the tube is comprised by a continuous elongate reinforcing material incorporated within a bonding material, characterised in that, seated or for seating in the top end of the receptacle is a hollow stopper formed of a frangible material and containing therein a liquid medium to act as a quenching agent for a wave front released in the container on activation of explosion therewithin. Both the containment device and the plug may comprise glass reinforced plastics (GRP). Thus, the reinforcing material of both is glass.

In a preferred form, the tube comprises a winding of filament glass fibre or of one of more glass rovings, the fibre or the rovings as the case may be, being impregnated with a bonding resin material, preferably a polyester resin material.

More particularly, the tube may be constructed of one or more E-glass continuous rovings incorporated in a halogenated polyester resin mix. Typical dimensions for the tube are:- Height 900mm, outside diameter 490mm

and thickness 18-19mm.

In a specific example, the support comprises a net of polypropylene material suspended from hooks or other suspension means located within the tube.

Alternatively, the support may be constituted by a soft plug, in particular a low density polyurethane plug.

In use, the receptacle will be placed upright in a convenient position in a postal handling area and should any postal item being handled appear to be suspect at all, the item will immediately be placed in the receptacle in order to isolate the item and the stopper placed in the upper end of the receptacle.

The basic receptacle has a very enhanced burst strength and should the postal item explode either involuntarily on or after being placed in the containment device, or as a result of a controlled explosion following investigation by specialist personnel, the receptacle will contain the explosion within the limits of explosive levels experienced to date. In more detail, in the event of such explosion, fragments produced in the explosion will either become embedded in the wall of the tube or will fall through a net as aforesaid or be embedded in a soft plug as aforesaid.

The bursting strength of the tube is of course related to the diameter and wall thickness of the tube. Some reduction of wall thickness is permitted as the diameter increases. Alternative wall thickness may be achieved by building up the tube in layers or laminations of rovings suitably impregnated with a bonding resin material.

Alternatively to the glass roving or rovings as described above, the tube may comprise a tube wound from a filament of glass fibre impregnated with a polyester resin material.

If desired, the tube may comprise an ultra-violet

inhibitor in the resin material formed during the production stage. This is particularly advantageous if the receptacle is to be kept in the open air during display since ultra-violet radiation can have a deleterious effect on either the plasticiser in the polymer of the resin or on the polymer itself.

Furthermore, the surface of the tube may additionally have a resin rich make-up so as to resist water ingression in the event of edges of the tube being cut or slightly damaged.

The plug itself comprised by a bomb containment device embodying the invention acts to suppress the blast. It is formed of a low density material such as plastics material and in particular frangible glass reinforced plastics and it may be a double-skinned wall having a foam core to provide rigidity. For this purpose, use may be made of self-expanding polyurethane foam which yields a cellular structure of very low weight.

For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made by way of example only to the accompanying drawings wherein:-

Figure 1 is a section through a bomb containment device embodying the invention;

Figure 2 shows the different patterns of wave front pressure achieved with a bomb containment device embodying the invention of GB-A-2222667 used with and without a stopper in accordance with the invention.

Referring to Figure 1, reference numeral 1 denotes a tubular bomb containment device having relatively thick walls, for example of 18-19mm. The container 1 is about 900mm tall and has an outside diameter of about 490mm. The lower part of the interior of the containment device is occupied by a plug 2 formed of

low density polyurethane material and blocking the bottom of the containment device. Entering the mouth 4 of the containment device is a plug 5 comprising a central portion 6 for closing the mouth 4 and a handling portion 7. The plug is sized to occupy the entire opening 4 of the container and is formed of glass reinforced plastics material. The stopper is hollow and is filled with water through an aperture 8 which is closed over after filling and acts as a pressure release valve.

Referring to Figure 2 of the drawings, this is a plot of pressure within a bomb containment device against time. Curve (A) represents the pressure behaviour when using a bomb containment device according to GB-A-2222667. There is no upward constraint on pressure build up and pressure rises to a sharp peak relatively rapidly before declining considerably over a period of time. When a plug is provided in the mouth of the container in accordance with the invention, the presence of the plug gives rise to reduction of pressure build-up within the container on detonation of a suspicious package 10 therewithin. A wave front 9 is generated within the container from the explosive package 10 as shown in Figure 1 eventually to be incident upon the stopper which is caused to shatter and release the water therein which forms a mist which quenches the pressure front which exists within the containment device. This results overall in a gentler pressure build-up and shallower pressure decay according to curve B in Figure 2.

The use of the frangible material for the plug ensures that there is a minimum amount of potentially damaging secondary airborne fragmentation caused as a result of the detonation.

The use of a plug in accordance with the invention is to be distinguished from existing devices which have

been used without a containment device as bomb blankets. While these are partially successful in reducing potentially damaging secondary fragmentation resulting from the detonation and may even include quenching agents, a skirting effect is observed as the pressure wave is unrestrained laterally and fragments from the explosion may be free to travel outwardly from the bomb at the lifted skirt of the bomb blanket.

CLAIMS

1. A containment device comprising a tube forming the wall of the receptacle and a support within the tube for supporting the suspect device, wherein the material of the tube is comprised by a continuous elongate reinforcing material incorporated within a bonding material, characterised in that, seated or for seating in the top end of the receptacle is a hollow stopper formed of a frangible material and containing therein a liquid medium to act as a quenching agent for a wave front released in the container on activation of explosion therewithin.

2. A containment device as claimed in claim 1, wherein the reinforcing material is glass.

3. A containment device as claimed in claim 2, wherein the tube comprises a winding of filament glass fibre impregnated with a resin bonding material.

4. A containment device as claimed in claim 2, wherein the tube comprises a winding of one or more continuous glass rovings impregnated with a resin bonding material.

5. A containment device as claimed in claim 3 or 4, wherein the resin bonding material comprises a polyester resin material.

6. A containment device as claimed in any preceding claim, wherein the support comprises a net of polypropylene material.

7. A containment device as claimed in claim 3 or 4 or any dependent claim thereof, wherein the tube has an

ultra-violet inhibitor incorporated in the resin.

8. A containment device as claimed in claim 3 or 4 or any dependent claim thereof, wherein the surface of the tube has a resin rich make-up to resist the ingress of water in the event of edges of the tube being damaged.

9. A containment device as claimed in any preceding claim, wherein the hollow stopper is formed of glass reinforced plastics.

10. A containment device as claimed in claim 9, wherein the stopper is of double walled construction, the walls being formed of glass reinforced plastics separated by a foam core.

11. A containment device as claimed in claim 10, wherein the foam core is formed from a self expanding polyurethane foam.

12. A containment device as claimed in any preceding claim, wherein the liquid medium is water.

13. A containment device for use as a receptacle for a suspect explosive device, substantive as hereinbefore described with reference to Figure 1 of the accompanying drawings.

Application No: GB 9921340.7
Claims searched: 1 to 13

Examiner: Ian Rees
Date of search: 31 January 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): F3C (CPK, CP2); A5A (A28, A37)

Int Cl (Ed.7): F42D (5/04, 5/045)

Other: Online: epodoc, japio, wpi

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 2335259 A	(PARKES). See Fig 6, elements 23 & 24	1
A	GB 2276530 A	(ROTATIONAL MOULDINGS). Fig 2	1
Y	GB 2222667 A	(POST OFFICE). See whole document.	1 to 6
A	GB 2041178 A	(SACKS). See lid 8 especially.	1
Y	US 4836079	(CUBE OVERSEAS). See integral lid 2, Figs 1 and 2	1 to 6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.